Plastic vs. Fiberglass

Pros:

- Low cost
- Quick and easy to produce in volume
- Low/no maintenance
- Extremely resistant to everyday abrasion
- Quick and easy to repair
- Good UV stability
- Extremely strong
- Naturally buoyant and waterproof
- Will not absorb water = no weight gain ever
- One piece construction = no seams = no splitting
- Exact control of material going in = every boat weighs the same

Cons:

- Slightly heavier than GRP (depends upon shape)
- Repair skills are less well known than GRP
- An invisible repair is unlikely
- Structural strength or stiffness is difficult to obtain without added weight
- Less torsional rigidity in mouldings than GRP
- Visually less appealing than GRP/Wood

How plastic boats are made – fittings attached

Mould is two pieces of aluminum (for even heat distribution) which are clamped together to make one piece. The plastic powder is added to the mould prior to the clamping of the two half moulds, then the whole device is put into an oven and rotated along a set program of tilts and turns. The plastic heats up and tumbles its way around the mold, sticking to the surface. The mould tilts precisely to get the right amount of thickness in the right places. When the plastic is spread out, it cools for a moment until it hardens and then a foam layer is added and the process is restarted. This gives the boat a “sandwich” construction to improve rigidity. Finally a third layer is added on the inside to complete the sandwich.
(depends upon manufacturer and model) The mould is then blown with fans to cool it evenly and is removed from the oven, while still rotating. The cooling boat shrinks by approximately 3% and is then removed into a cooling jig which finalizes its shape. As the boat finally cools down its fittings are screwed into the inserts and parts are added.

The mould has threaded pins in the places where fittings are finally placed on the boat. Before the mould process is started, a brass insert with backing washer is screwed onto the threaded plate. The insert sits inside the mould, and as the heated plastic gathers around the insert it is encapsulated into the mould. When the boat is removed from the mould the insert is flush with the boat and a fitting can be screwed into it. The insert (with washer) can hold a sheer load of 500kg each, and are even stronger with a backing plate.

To add local strengthening, small aluminum right angle strips are added to the inside of the mold before the process begins. The plastic encapsulates the metal and gathers in the ridge to create a stiffened area. This is used under the floor and under mast steps, also behind toe strap attachment points for added strength. Stainless steel plates are added behind rudder pintles to reinforce grounding loads.

**Benefits for end user, school**

- Low cost per unit
- Low maintenance
- Excellent day to day abrasion resistance
- Quick and simple to repair
- Extremely hard wearing
- Very flexible skin reduces/eliminates holes caused by bad collisions

**Limitation on plastic**

- Product size is limited by size of Rotomolding machine (oven size)
- Weight increases dramatically with size to gain sufficient panel stiffness
- No internal stiffening to support rigging load
- Shape of boat is determined by ability to release from the mould (the moulding must be accessible 2D, i.e. corners and scoops are not possible
- Very local reinforcement is not possible, so the whole boat has to be as strong as the area that requires the most strength

**Future of plastic**

- Improvements to properties of powder will allow shinier, harder finishes which compare closer to GRP finishes. This will allow better dent resistance, easier repair and reduced cracking potential.
Improvements to centre foam layer material properties will allow reduction in shot weight of material = lighter boats. This will be done by adding stiffness to the foam layer rather than it just being a sandwich.

More intricate design will allow larger and more powerful sailboat models.

More intricate design will allow internal stiffening to improve torsional rigidity and improve distribution of rig loads. Tests with in mould wire space frames have been experimented (in mould shroud from mast step to shroud points and up to foredeck for example, or meshed metal frame to triangulate rig load and reduce twist).

**Interesting Notes**

Hobie Cat, LaserPerformance, RS Sailing, Topper, Bic and most recreational kayaks are made from rotationally moulded polyethylene. Manufacturers who do not use this method do so because of upfront costs.

Two of the largest rotomoulders in the world are Little Tikes and Fisher Price. All those outdoor play sets in back yards are rotomoulded products. This means other industries are also driving the technology and supporting the legitimacy of this construction method.

In 2010 at the Toronto International Boat Show, Fogh Marine displayed 65 sailboats, dinghies, catamarans and kayaks. Two were manufactured with fibreglass.